

Muon Trigger Update

LArIAT Meeting
March 31st, 2013

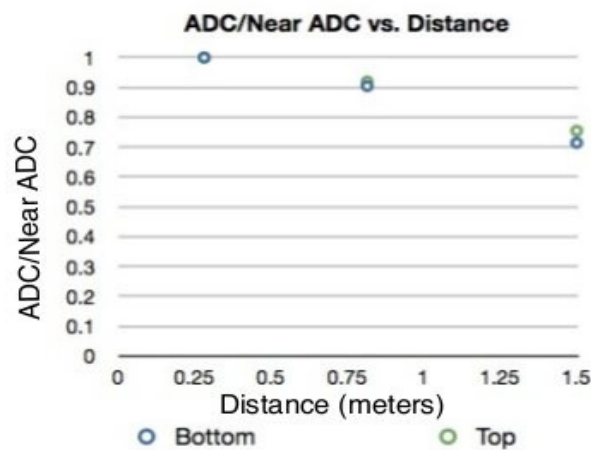
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What we have/will have

- ✓ 40 6' counters (without PMTs) and 12 PMTs arrived at the Pole Building last Tuesday. A total of 49 6' counters (8 with PMTs, 41 without) and 20ish PMTs are now stored at the Pole Building.
- ✓ 40 10.5' counters, 80ish 6' counters (all with PMTs + some spare counters) and almost all the required cables are at CDF, packed and ready to be moved to Wideband within few days (thanks to Jen!).
- ✓ Thanks to Alan, the PC for the test stand at the Pole Building has now Labview installed and the first pieces of a Labview acquisition program.
- ✓ Yesterday the material from PREP (finally!) arrived. Now we have NIM and CAMAC modules and crates to realize two test stations. Today we should start setting up the test station for the Pole Building.
- ✓ On July we'll extract the rest of counters and cables needed.

Playing with counters

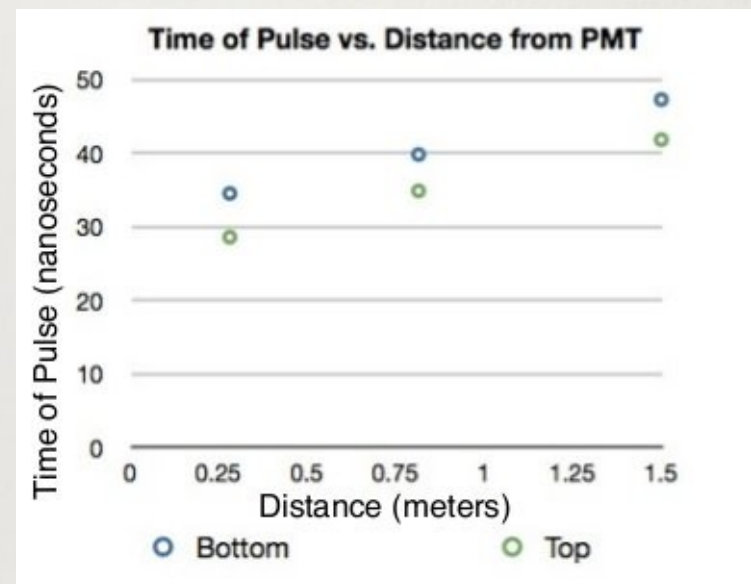
Some pre-test has been done with the first two counters inherited from CDF. We first looked at the ADC and TDC spectra for events from mu crossing the scinitllator close to, middle way and far from the PMT.



The ~30% light loss does not affect the trigger rate of crossing muons!

	Top Counter Rate (Hz)	Bottom Counter Rate (Hz)
Near PMT	0.47 ± 0.03	0.48 ± 0.03
Far from PMT	0.46 ± 0.01	0.49 ± 0.01

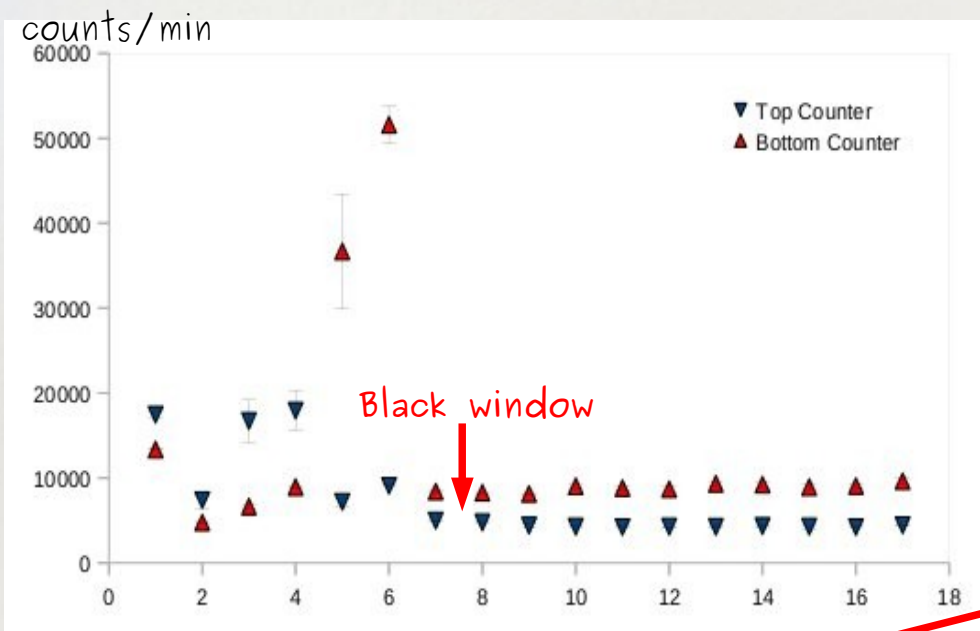
Measured transit time along the wavelenght shifter fiber consistent with expectations!



Playing with counters

...then we started looking at the single count rate and troubles started...

At least two problems found: highly instable counting rate (up to a factor ten of variation in the counting rate of each counter) and "weird" counting mode.



Count rate fluctuations given by exposure to sunlight. Fixed by covering the window.



New counters position

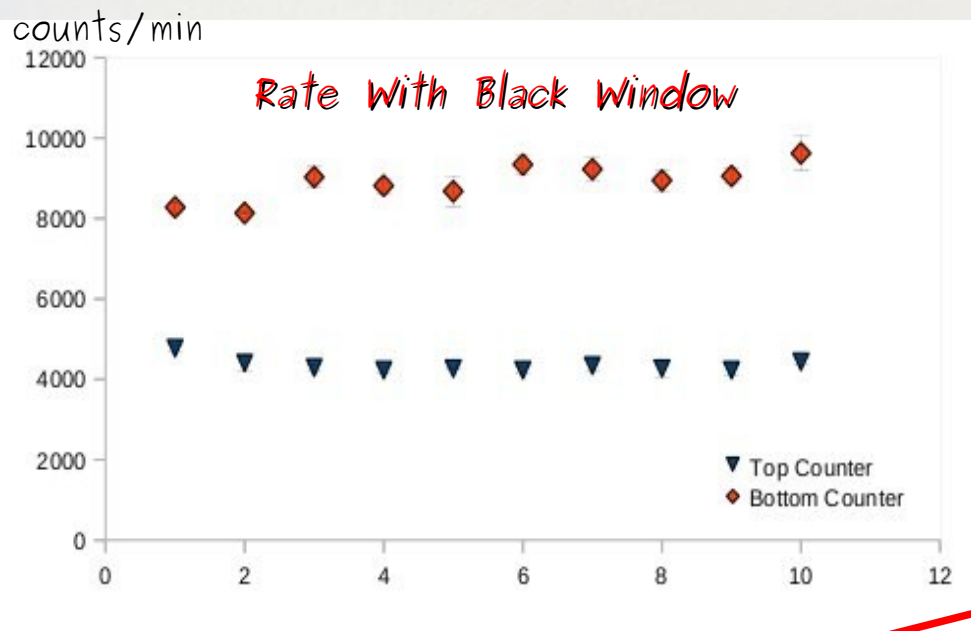
old counters position

window

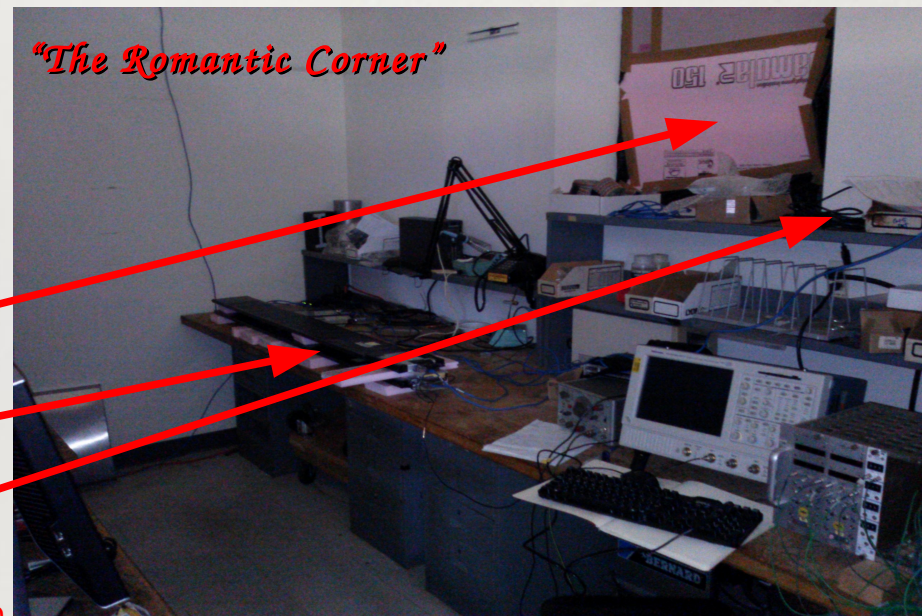
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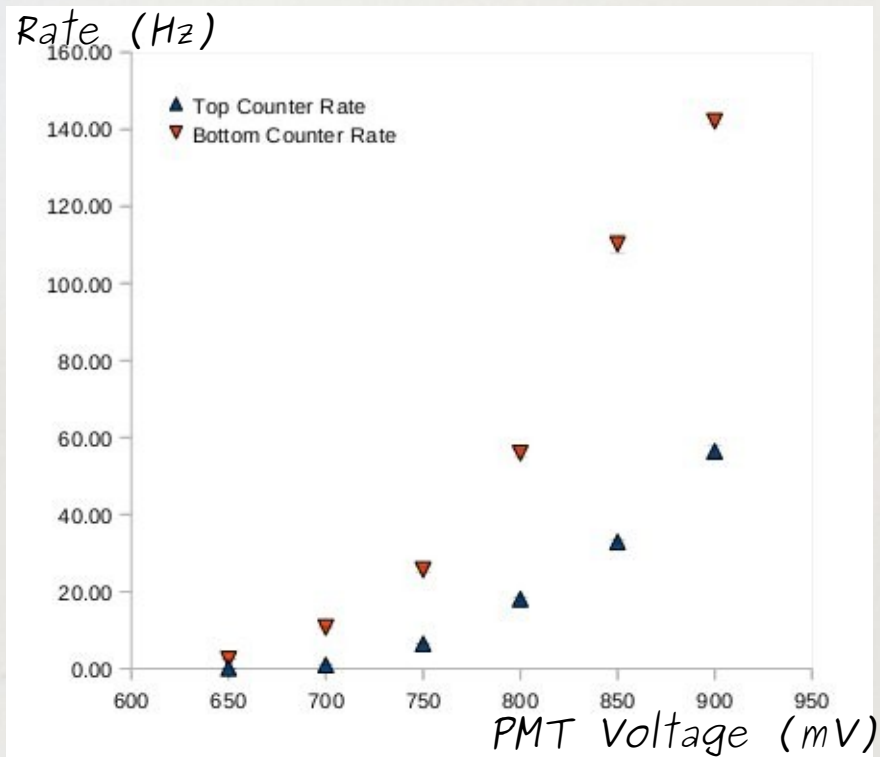
Window

New counters position

Old counters position

Playing with counters

About the "weird" counting rate, signals showed several afterpulses/ringing, even μ s after the signal. Being not possible to raise PMT threshold above 3.5 mV, we tried to lower PMT voltage to push this "noise" under threshold and get rid of it.

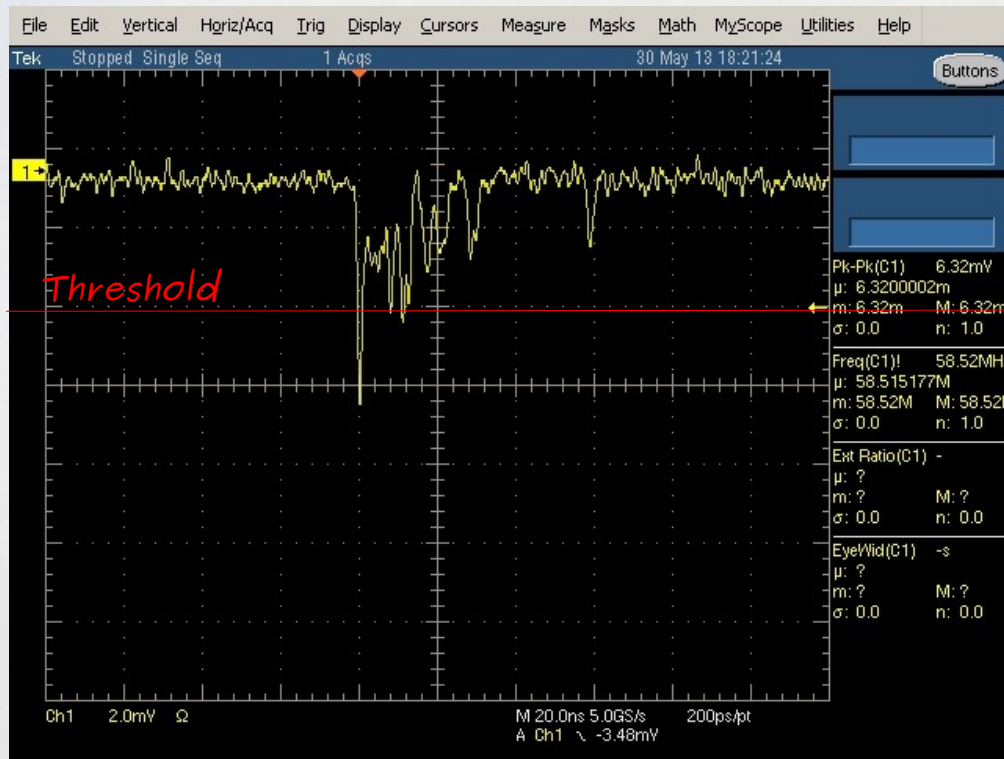


For the top counter, multiple countings are still present @ HV=700 mV and 1 Hz counting rate

For the bottom counter, multiple countings are still present @ HV=650 mV and 2 Hz counting rate

Playing with counters

Top Counter raw signals @ PMT V=700 mV



The shape of the signal is such to produce multiple triggers within few tens of nanoseconds. Two ideas to mitigate this noise: to use wide gates (100–200 ns) which will include these multiple hits and to run at the highest threshold and lowest voltage for which the efficiency is at its plateau.